

Engineering Division
W/OS0321: FJZ

NOAA WIND PROFILER MODIFICATION NOTE 4
(for Electronics Technicians)

SUBJECT : Wind Profiler Air Conditioner Relay Heat Sink
Installation

PURPOSE : To prevent solid-state relay overheating.

EQUIPMENT AFFECTED : Wind Profiler

PARTS REQUIRED	: <u>Quantity</u>	<u>Description</u>
	2	Wiremold extra deep switch box (P/N 5744-2)
	2	Heat sink assembly:
	1	• Aavid heat sink (custom machined) (P/N 62200)
	1	• Magnecraft 40 amp solid state-relay (or equivalent) (P/N W6225DSX-1)
	1	• Power Devices Thermstrate (P/N AL-225-175)
	2	• #8-32 x 3/8" pan head screw
	2	• #8 star washer
	9	#6-32 x 1/2" flat head screw
	9	#10 x 1" wood screw
	9	#6-32 x 1" hollow wall anchor
	9	#10 flat washers
	2	#12 blue wire, 21" cut/formed W1
	2	#12 black wire, 15" cut/formed W2
	2	#12 green wire, 17" cut/formed W4
	7	Wire nut, yellow
	4	Panduit #8 lug, 22-18 AWG (P/N PN18-8R-C)

MODIFICATION : Each station will receive the required kits. No
PROCUREMENT technician action required.

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SPECIAL TOOLS AND TEST EQUIPMENT REQUIRED : Electronics tool kit including straight and Phillips screw drivers, needle-nose pliers, lineman pliers, lug crimp
Electric drill with drill bits up to 1/4"
Heat gun

TIME REQUIRED : 4 Working hours, plus travel

EFFECT ON OTHER INSTRUCTIONS : None. File this note in EHB-9.

CERTIFICATION : The Profiler Program Office (PPO) tested this modification.

GENERAL

There have been numerous dramatic failures of the revised air conditioner relay heat sink kits provided by Unisys due to overheating of the solid-state relay.

The PPO has designed a new relay/heatsink configuration for all profiler sites. This new modification provides sufficient heat transfer from the solid-state relay to the ambient shelter air to prevent relay overheating. Furthermore, it provides more room for wiring inside the mounting box as well as simplifies repairs. The Profiler LRU Replacement Guide or Operations and Maintenance Manual should be used as a maintenance guide by the technician.

PROCEDURE

A. Installation

1. Notify the Profiler Control Center (PCC) at (303) 497-6033.
2. Power down the profiler by turning off breakers 17/19, 22; and 24 in that order.
3. Turnoff breakers 12/14 for air conditioner #1 and 9/11 for air conditioner #2. Alternatively, you may work on one air conditioner at a time and put the other air conditioner in BYPASS to cool the shelter while you work.

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4. Unplug the air conditioner power cord, remove and save the screws from the face plate of the air conditioner control box and pull the face plate away from the box.



Verify with a voltmeter that AC voltages are absent, particularly if you are working on one relay box at a time.

5. Inspect the toggle switch, indicator lamp, 220-volt receptacle, and control wires of the face-plate assembly.



If any of the components of the face-plate assembly have been burned, contact the PCC for replacements and discontinue this installation.

6. Disconnect wires as required to completely remove the face plate from the box leaving the bypass switch, indicator lamp, and 220-volt receptacle attached to the face plate. Completely remove the box and wall plate from the shelter wall.
7. Mount the wall plate for the new box as shown in the drawing titled "MOUNTING PLATE FOR ECU CONTROL BOX." Center either of the two inside tabs of the wall plate to the metal raceway.
8. Mark the position of the mounting holes on the wall and drill a 1/8" pilot hole: If wood is used to mount the wall plate, use the wood screws with #10 flat washers provided. Otherwise, drill a 1/4" hole to use the hollow wall anchors with #10 washers provided.
9. Lay the new heat sink and face plate assemblies face down and wire them together using the pre-cut and formed wires as shown in the drawing titled "ECU CONTROL BOX WIRING DIAGRAM" (sheet 1 of 2).

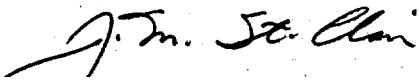
10. After you wire W1 to the switch, use an ohmmeter to check that the terminals of the switch are all shorted when the switch is in BYPASS. Crimp lugs on the wires of the indicator lamp if they do not already have them. Refer to the drawing titled "ECU CONTROL RELAY SCHEMATIC" for the circuit schematic.
11. Remove the appropriate knockouts for the raceways and mount the Wiremold box to the wall plate at each corner with the four long screws. Connect one end of the green wire (W4) to the nearest mounting screw on the back plate.
12. Wrap the pre-stripped mid-section of wire W4 around the ground terminal of the receptacle and tighten the screw. Using a yellow wire nut, connect the remaining end of wire W4 to the ground wire that leads into the raceway.
13. Connect the blue and red wires to the two black AC lines that lead into the raceway (using two yellow wire nuts). There is no preferred polarity for the AC wires. Refer to the drawing titled "ECU CONTROL BOX WIRING DIAGRAM" (sheet 2 of 2) for an illustration of these wiring connections.
14. Connect the relay control lines as shown in the drawing titled "ECU CONTROL BOX WIRING DIAGRAM" (sheet 2 of 2). Note that terminals 3 and 4 of the solid state relay are polarized. Match the polarity (labeled + and -) of the control wires to the polarity of the relay terminals.
15. Assemble the face plate and heat sink to the box as shown in the drawing titled "ECU CONTROL BOX MECHANICAL ASSEMBLY" with the #6-32 screws.
16. Plug the air conditioner power cord into the outlet, set the switch in the NORMAL position, and toggle the air conditioner breaker to the on position.
17. With the switch in the NORMAL position, the air conditioner should not come on. If the air conditioner does turn on, call the PCC. It is likely that either the heat sink box is installed incorrectly or the 40-amp relay has a short circuit.

This completes the installation procedure.

B. System checkout

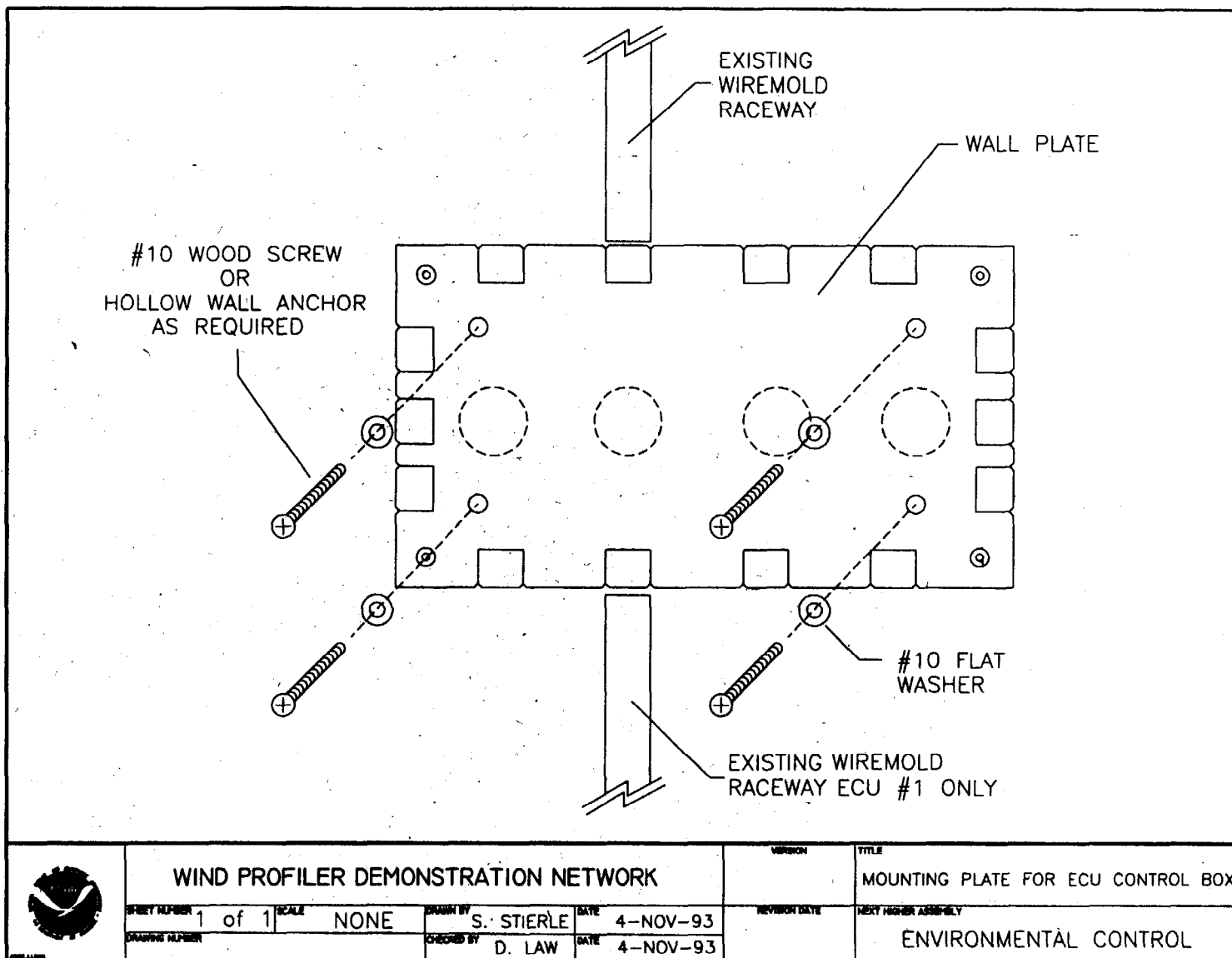
1. You should test the BYPASS mode for each air conditioner before you power up the rest of the profiler. Verify that the air conditioner front panel controls are set properly.
2. With the switch in the BYPASS position, the BYPASS MODE lamp should illuminate and the air conditioner should immediately turn on regardless of the outside or inside temperatures. This test verifies proper wiring and operation of the bypass switch, the indicator lamp, and the air conditioner.
3. To test the solid state relay operation, refer to the Environmental controls section of the Digital Interface Board Installation Procedures for NWS Field Engineers.

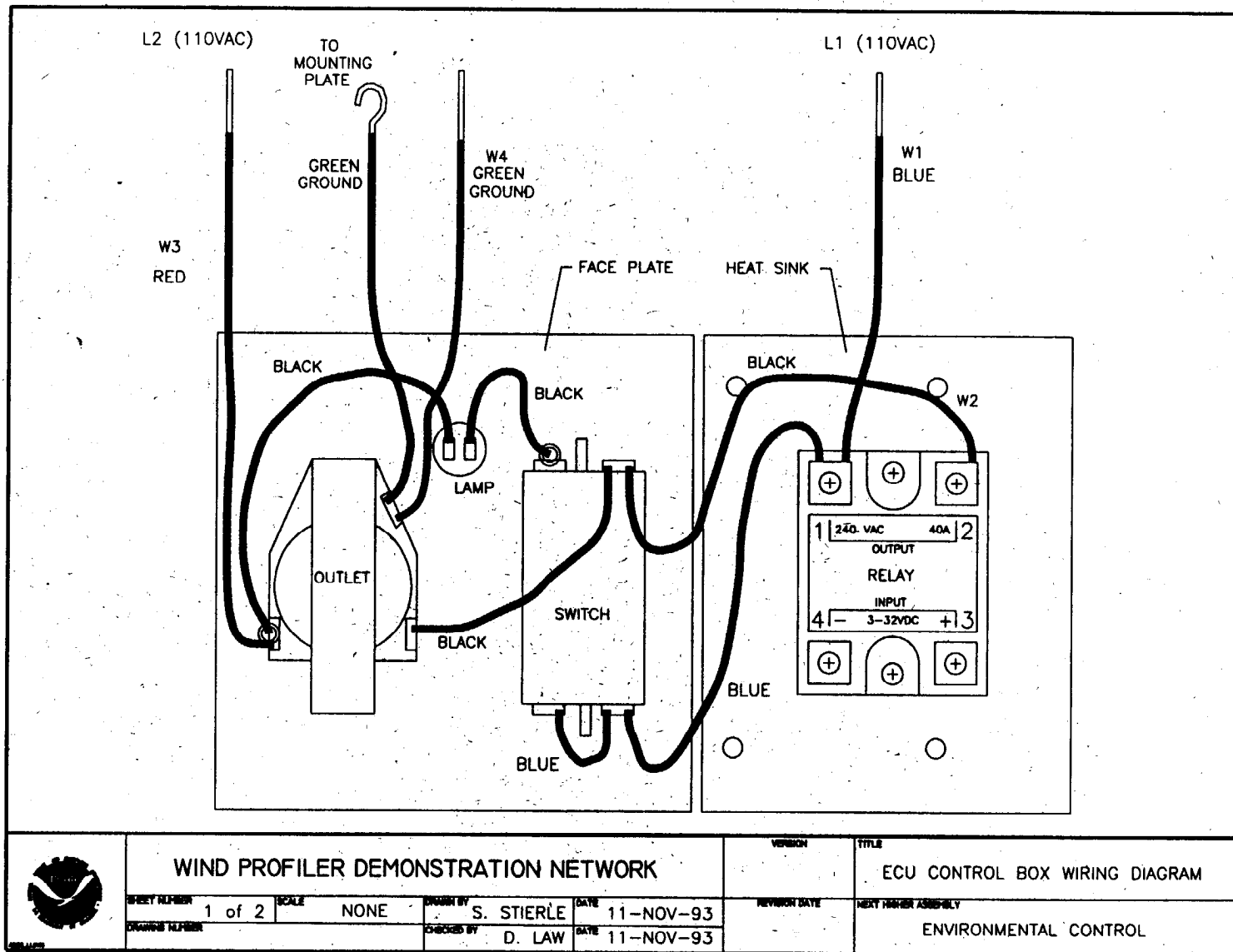
This completes the system checkout procedure and modification.



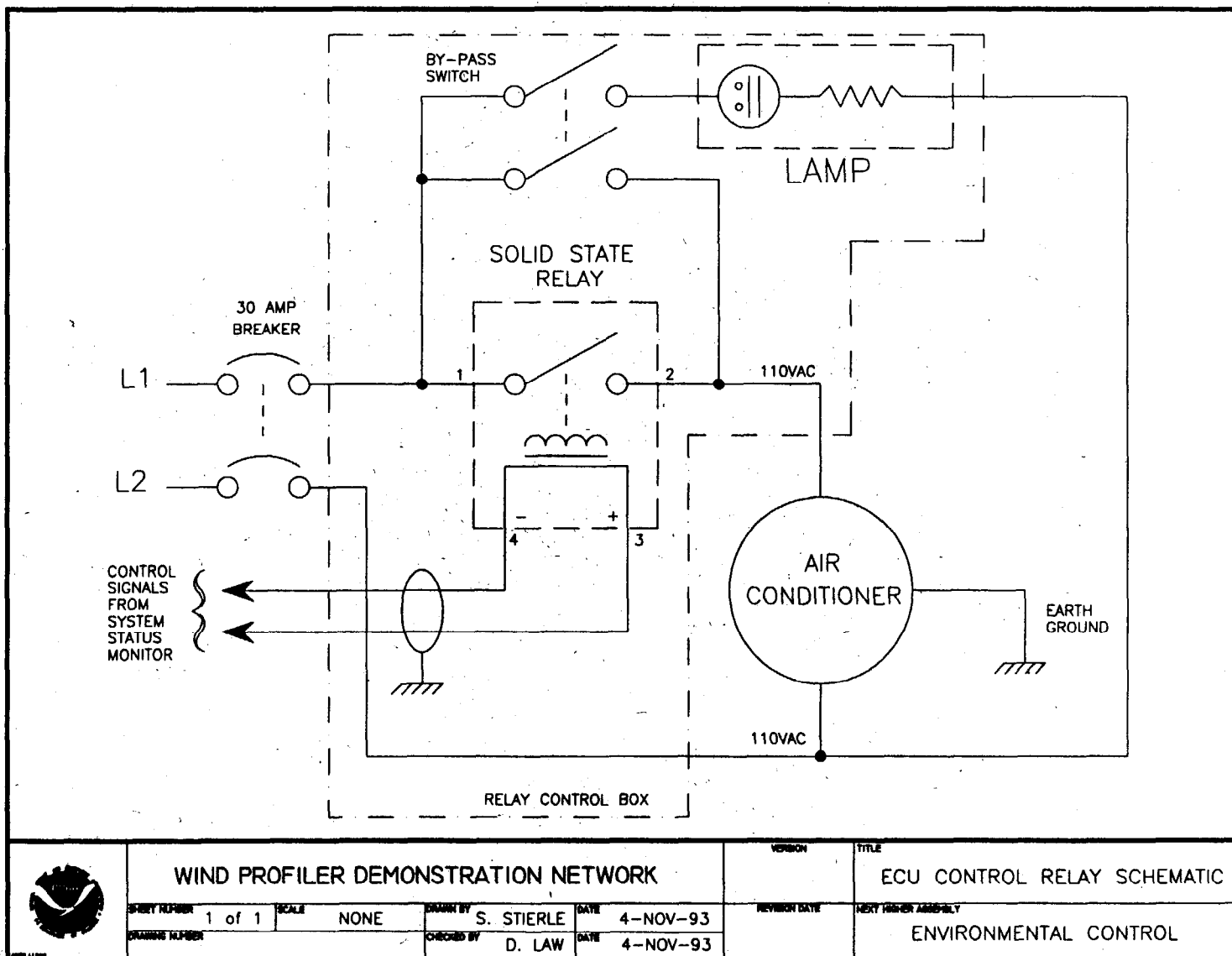
J. Michael St. Clair
Chief, Engineering Division

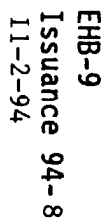
Attachments

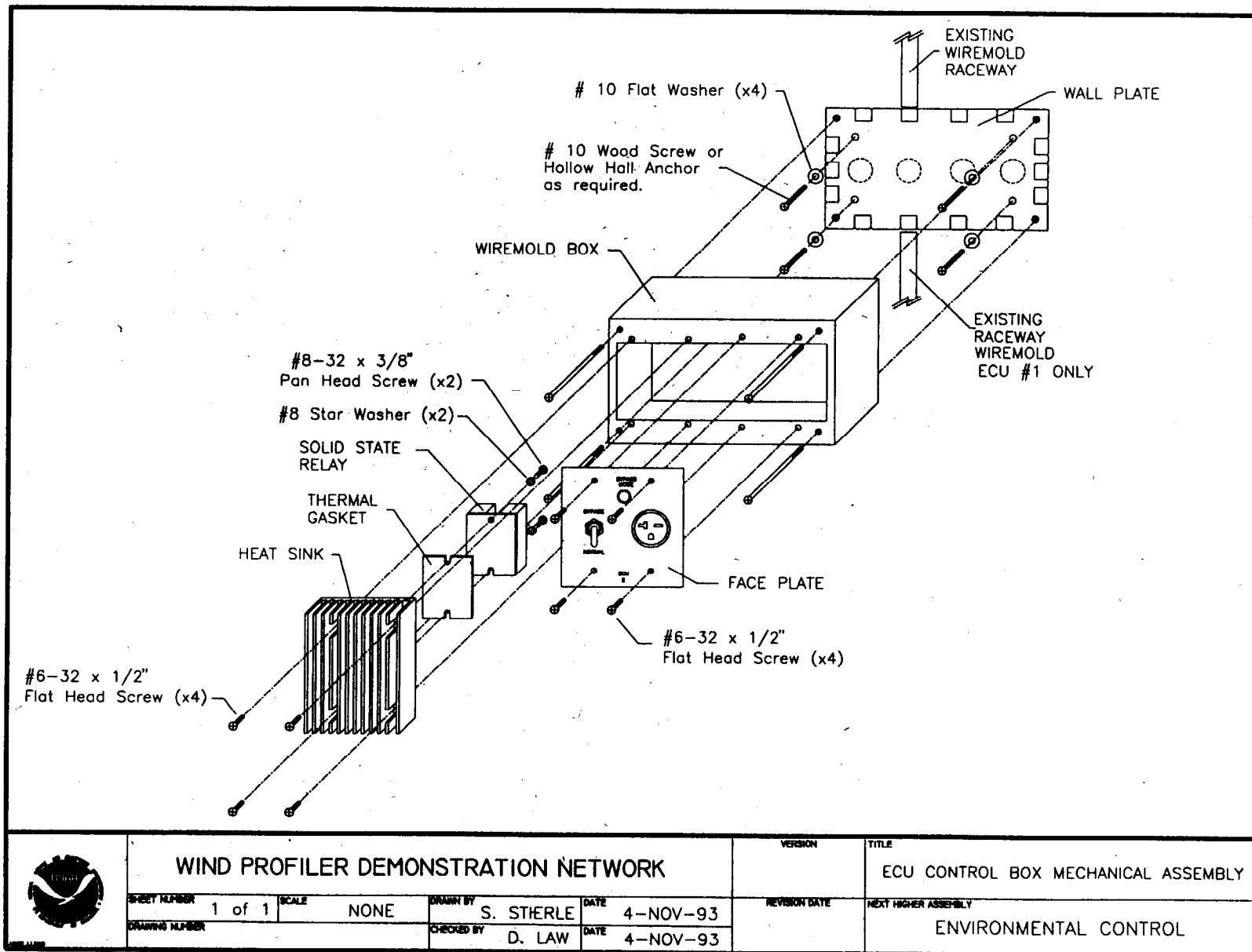


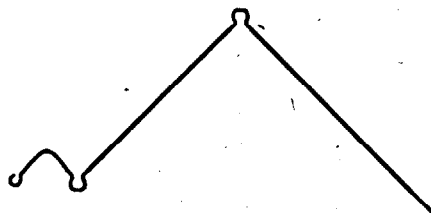
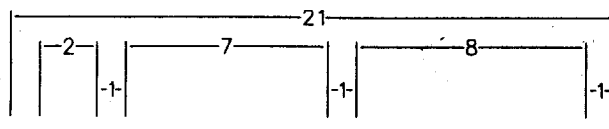


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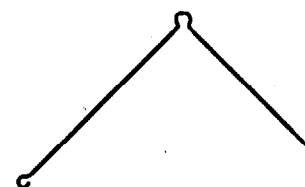
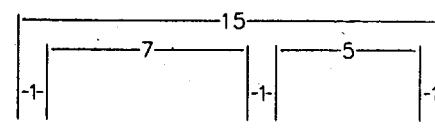




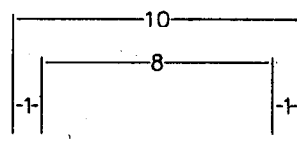




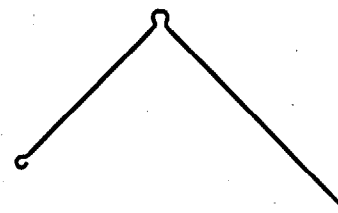
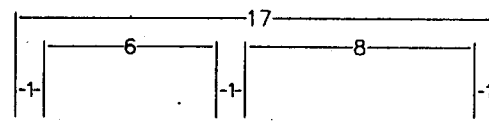
WIRE: W1
COLOR: BLUE



WIRE: W2
COLOR: BLACK



WIRE: W3
COLOR: RED



WIRE: W4
COLOR: GREEN

NOTES:

1. ALL WIRES ARE SOLID COPPER
12 AWG / 600 VOLT
2. WIRE IS GASOLINE AND OIL RESISTANT
3. ALL DIMENSIONS ARE IN INCHES



WIND PROFILER DEMONSTRATION NETWORK

SHEET NUMBER	1 of 1	SCALE	NONE	DRAWN BY	S. STIERLE	DATE	12-NOV-93
DRAWING NUMBER		CHECKED BY	D. LAW	DATE	12-NOV-93		

VERSION

TITLE

WIRE PREPARATION FOR AC RELAY CONTROL BOX

REVISION DATE

NEXT HIGHER ASSEMBLY

ENVIRONMENTAL CONTROL

Engineering Division

W/OS0321: FJZ

NOAA WIND PROFILER MODIFICATION NOTE 5
(for Electronics Technicians)

SUBJECT : Status Monitor Digital Interface Board (Type 2)
Replacement Procedure

PURPOSE : To prevent the 40-amp solid-state relays from melting.

PARTS REQUIRED : Quantity Description

1 Status monitor digital interface board

MODIFICATION : Each station will receive the required kits. No
PROCUREMENT technician action required.

SPECIAL TOOLS AND : #2 Phillips screwdriver
TEST EQUIPMENT #3 Phillips screwdriver
REQUIRED Large flat blade screwdriver
Regular flat blade screwdriver
Very small flat blade screwdriver
Heat gun
Digital (or analog) multimeter
Flashlight

TIME REQUIRED : 2 working hours, plus travel.

EFFECT ON OTHER : None. File this note in EHB-9.
INSTRUCTIONS

CERTIFICATION The PPO tested this modification.

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9-14-94

GENERAL

The Status Monitor Digital Interface Board has been redesigned to solve two problems:

1. The voltage levels supplied by the present Digital Interface Board are not high enough to drive the 40-amp solid state relays.
2. When the 40-amp solid state relay overheats, the excess current damages the Digital Interface Board. This problem is solved by fusing the output of the new Digital Interface Board.

This modification note provides the procedure to replace and verify operation of the Status Monitor Interface Board.

PROCEDURE

A. Removal and Installation

1. Power down the radar by turning off breakers 17/19, 22, and 24 in that order.
2. Remove the four mounting screws from the front panel of the system status monitor located in the equipment cabinet.

NOTE

To prevent cable binding in the next step, it may be necessary to pull out the power supply drawers beneath.

3. Carefully pull the status monitor out to its full stop position.
4. Remove the top cover from the status monitor and locate the digital interface circuit board in the chassis. Refer to Figure 1 for the internal component layout of the status monitor.

5. Note the interface cable connections to the digital and analog interface circuit boards. Remove the interface cables from the digital interface circuit board.
6. Remove the analog and digital interface boards from the chassis.
7. Mount the new digital interface circuit board in the chassis and connect the interface cables. For the time being do not re-mount the analog interface circuit board.
8. **Without shorting the analog interface circuit board against the chassis or other metal components**, situate the analog circuit board so that the digital board's test points will be accessible.
9. Power up the radar by turning on breakers 24, 22, and 17/19 in that order.
10. Perform the tests described in the Verification of Operation.
11. If all tests pass, power down the radar and secure the analog board in the status monitor. Reconnect the interface cables to the analog board and replace the status monitor's top cover. Slide the unit back into the rack.
12. Replace the mounting screws on the status monitor face plate and power up the radar as described in step 9.
13. Discard the old digital interface board.
14. If any of the tests fail, contact the Profiler Control Center for assistance at (303) 497-6033. Schematic diagrams of the digital interface board are supplied to aid in troubleshooting any problems.

Verification of Operation

The following tests are performed to verify proper operation of the new digital interface board. It is essential that the environmental controls of the board are confirmed to prevent the possibility of a fire hazard. If any of the tests outlined below fail, contact the PCC for assistance.

Environmental Controls

Verify proper operation of ECU#1, ECU#2, Exhaust fan, and main breaker trip relay by performing the following procedures.

NOTE

The outside temperature must be above 60°F (15°C) for the Environmental Control Units (ECU) to turn on. If the outside temperature is below 60°F, high outside temperatures can be simulated. To do this, disconnect the outside temperature probe connector from port J10 on the rear panel of the status monitor assembly.

1. Verify that the inside and outside temperature readings on the PMT are within $\pm 2^{\circ}\text{C}$ of the temperature meter displays on the front panel of the Status Monitor Assembly. The readings are obtained from the following PMT menu:

Display Current Output Menu ->
Landline Output Menu ->
Status Data Menu.

2. Wave a heat gun across the top 1/3 of the inside temperature probe to simulate raising the inside temperature.

CAUTION

DO NOT hold the heat gun continuously on the probe as this may destroy the sensing element in the temperature probe.

3. The "inside temperature" digital readout on the status monitor assembly will show the inside shelter temperature slowly increase.

4. Gradually increase the inside temperature to approximately 33°C **but not higher.**

CAUTION

DO NOT let the temperature reach 37°C at any point during this test or the main breaker may trip.

5. Hold this temperature for approximately 15 minutes. If the system is functioning correctly, the listed events should occur in following order:
 - Both ECUs will come on, first one, then the other
 - The exhaust fan will turn on.
6. If either the ECUs or fan have not turned on, contact the PCC for assistance.
7. After both the ECUs and fan have turned on, disconnect the inside temperature probe from the connector at the top of the BSU cabinet. This will simulate an over-temperature condition inside the shelter.
8. If the system is working properly, the status monitor will trip the main breaker in approximately 45 seconds. If several minutes have passed and the main breaker has not tripped, contact the PCC for assistance.
9. If the main breaker trips, turn off breakers 17/19, 22, and 24 in the Power Distribution, Panel on the shelter wall opposite the Transmitter or PA cabinet. Open the-shelter door or use a flashlight to view the fuse panel.
10. Reset the main breaker in the Circuit Breaker Panel.
11. Reconnect the inside temperature probe.
12. If necessary; reconnect the outside temperature probe to port J10 on the rear panel of the status monitor.

13. Turn on breakers 24, 22, and 17/19 in that order.
14. If any of the tests do not react as expected, contact the PCC for assistance.

Power Amplifier Quad Control

The operation of the Power Amplifier Quad control can be accomplished using the PMT and the AMP local monitor.

1. Put the radar in maintenance mode.
2. Select Auxiliary Operations from the PMT Main menu.
3. Select Quad Control from the PMT Auxiliary Operations menu.
4. Set the Quads Enable bits 1-4 to "0000".
5. Return radar to operational mode.
6. Put the AMP local monitor in LOCAL mode.
7. Verify that all 16 power amplifier modules are not putting out any power. Confirm this by stepping through the modules and observing the OUTPUT POWER METER reading for each.
8. Press the SYSTEM POWER OUT button and observe the lower left hand meter. Eventhough the RF input LED may be green, no meter deflection should be observed. If functioning correctly, all four Quads will be disabled and the PA modules will not emit any power.
9. Put the radar in maintenance mode and set the Quad enable bits-to "1111".
10. Put the radar in operational mode.

Site Access Alarms

1. Opening the front door of the shelter should generate a "Shelter Access Alarm" in the PMT Failure Data Log.

2. After the test, reset the "Shelter Access Alarm" immediately from the Status Monitor Reset menu of the PMT.
3. Opening the shelter rear door or the antenna fence gate should generate a "Fence Access Alarm" in the PMT Failure Data Log and shut off the transmitter output.
4. Transmitter shut down can be verified using the AMP local monitor. Under this condition, the transmitter is shut down by turning off the bias-gate for the individual PA Quads rather than by disabling the RF input. Even though the transmitter may be turned off, the RF INPUT LED is still green.
5. Press the button next to the SYSTEM POWER OUT LED. Observe the analog meter on the lower left side of the AMP local monitor. If there is no meter deflection the transmitter has -been disabled.
6. After the test, reset the access alarm immediately from the Status Monitor Reset menu of the PMT.

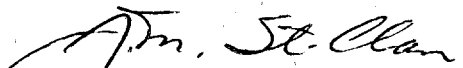
BSU Fault Detection

The BSU fault detection feature of the digital interface circuit board is tested prior to shipment. It is not necessary to field test this function.

This completes. the modification note.

Reporting Modification

Target date for completion of the modification is 30 days after receipt of the kits. Report completed modifications on WS Form A-26, Maintenance Record, according to instructions in EHB-4, part 2, using reporting code PROF.



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Attachments

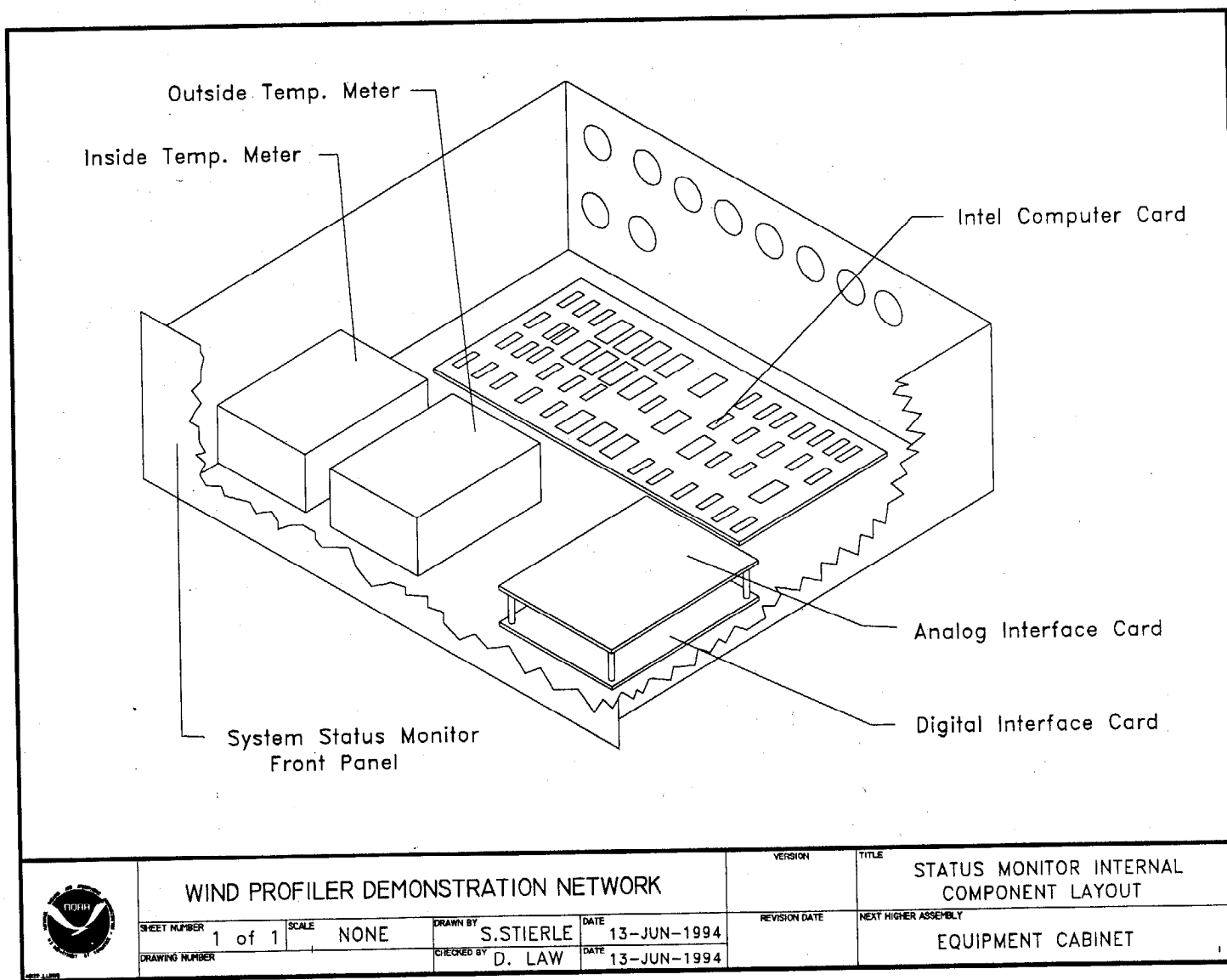
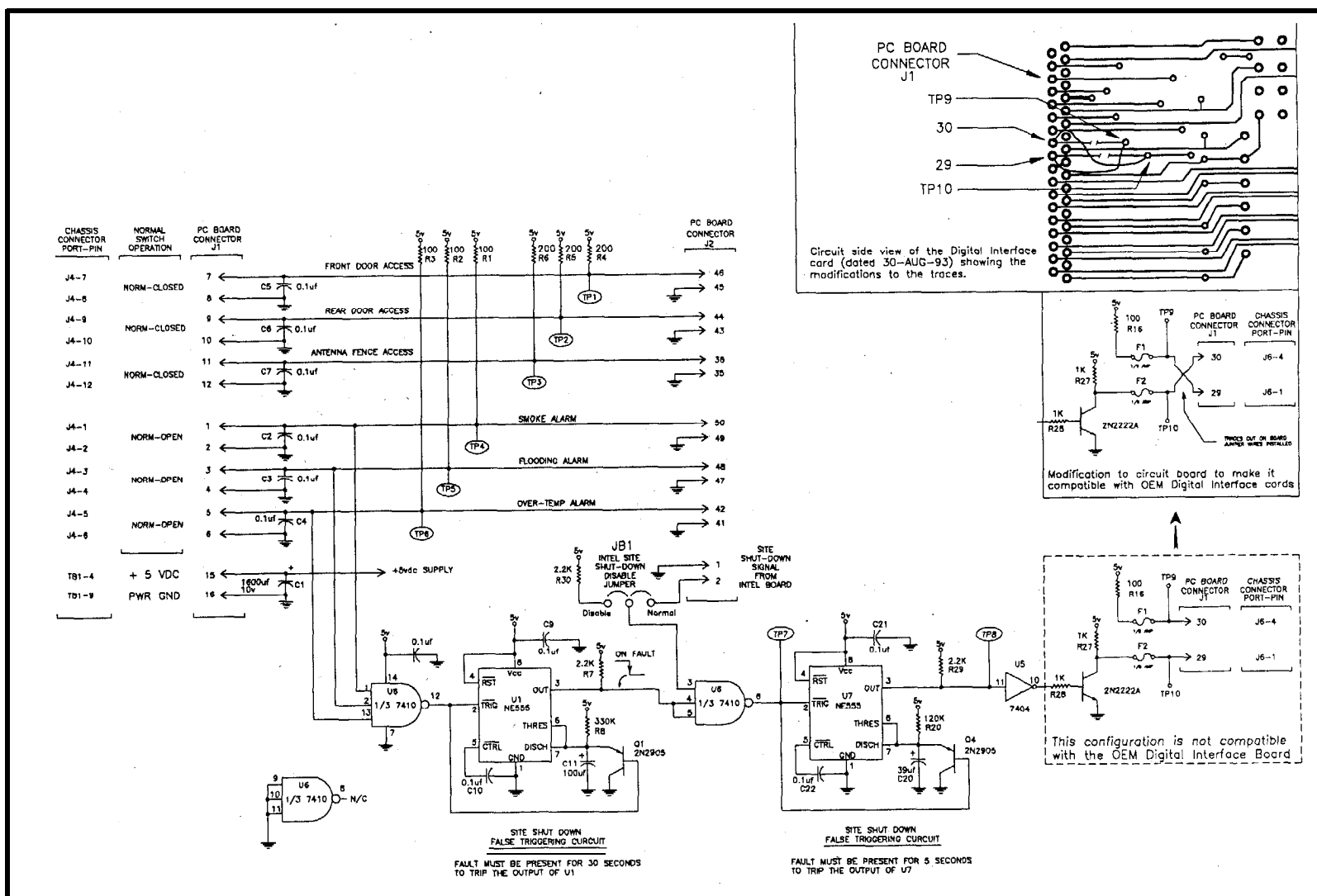



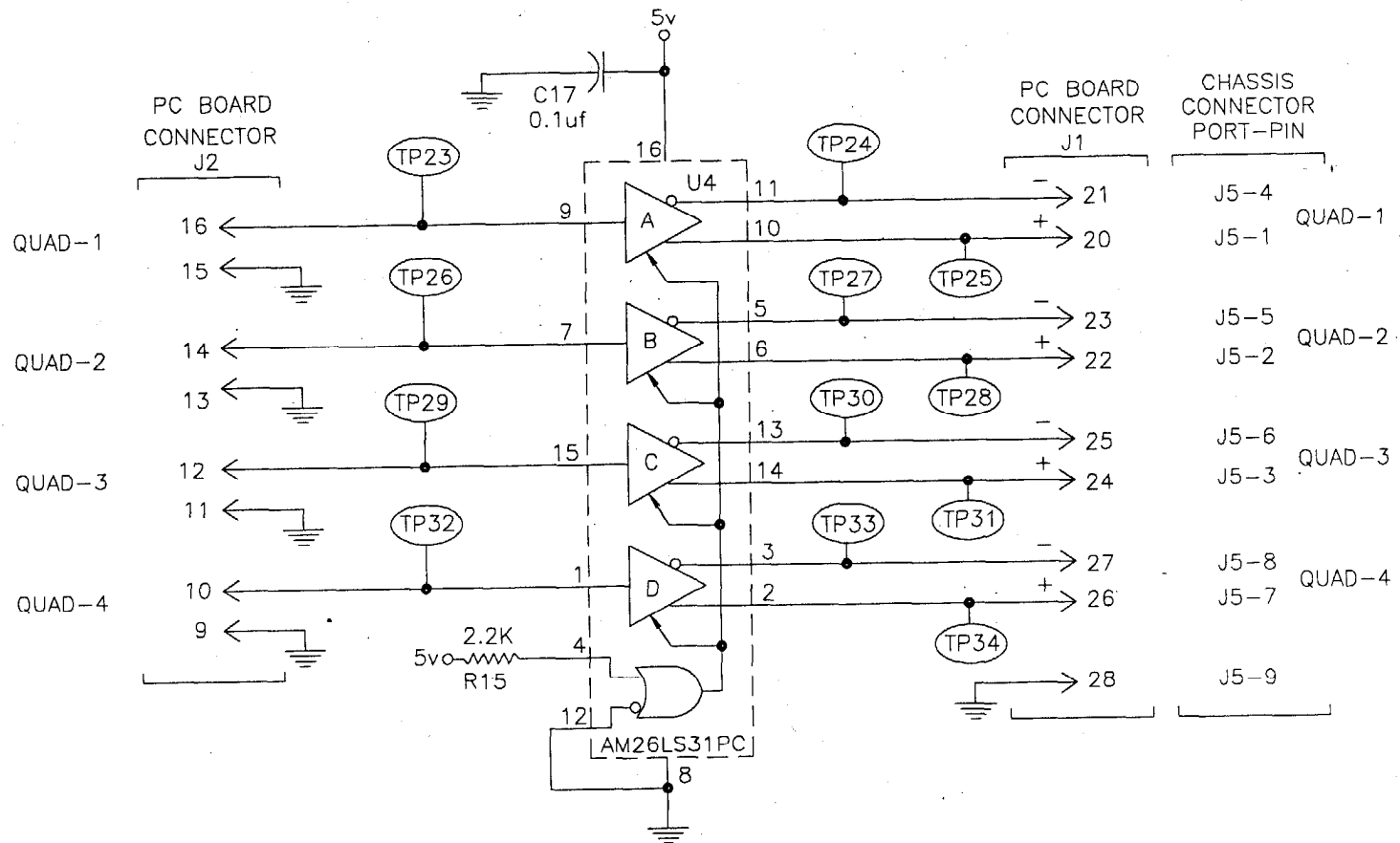
Figure 1 Status Monitor Internal Component Layout



	WIND PROFILER DEMONSTRATION NETWORK				TYPE 2	SITE ACCESS AND SITE SHUT-DOWN CIRCUITRY	
	SHEET NUMBER	1 of 4	NONE	S. STIERLE	8-OCT-93	REVISION DATE	NEXT HIGHER ASSEMBLY
	DRAWING NUMBER			CHECKED BY	D. LAW	9-OCT-93	8-OCT-93



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WIND PROFILER DEMONSTRATION NETWORK

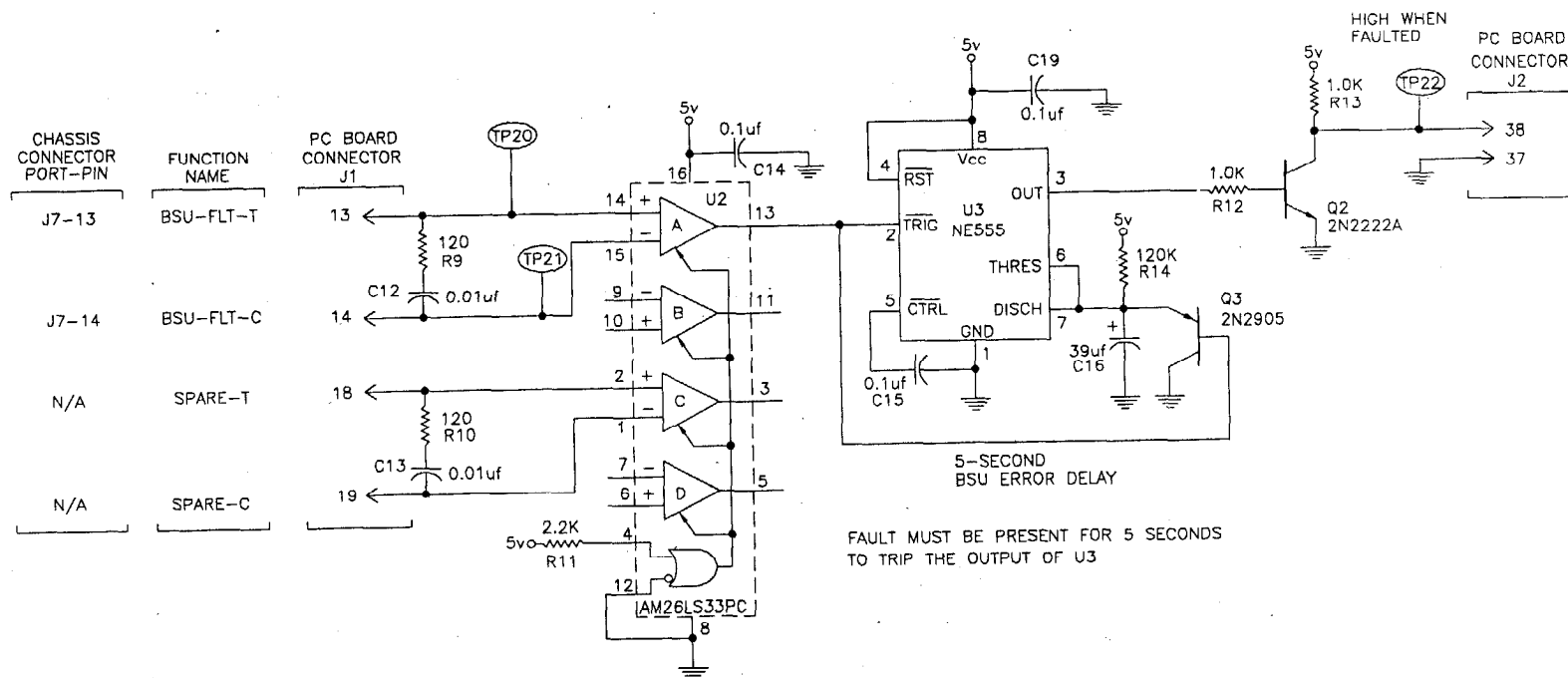
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DRAWN BY S. STIERLE
CHECKED BY D. LAW

DATE 8-OCT-93
DATE 9-OCT-93

VERSION
TYPE 2
REVISION DATE 8-OCT-93

TITLE
DIGITAL INTERFACE SCHEMATIC
POWER AMPLIFIER MODULE
QUAD CONTROL DRIVER CIRCUITRY
SYSTEM STATUS MONITOR



WIND PROFILER DEMONSTRATION NETWORK

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DRAWING NUMBER

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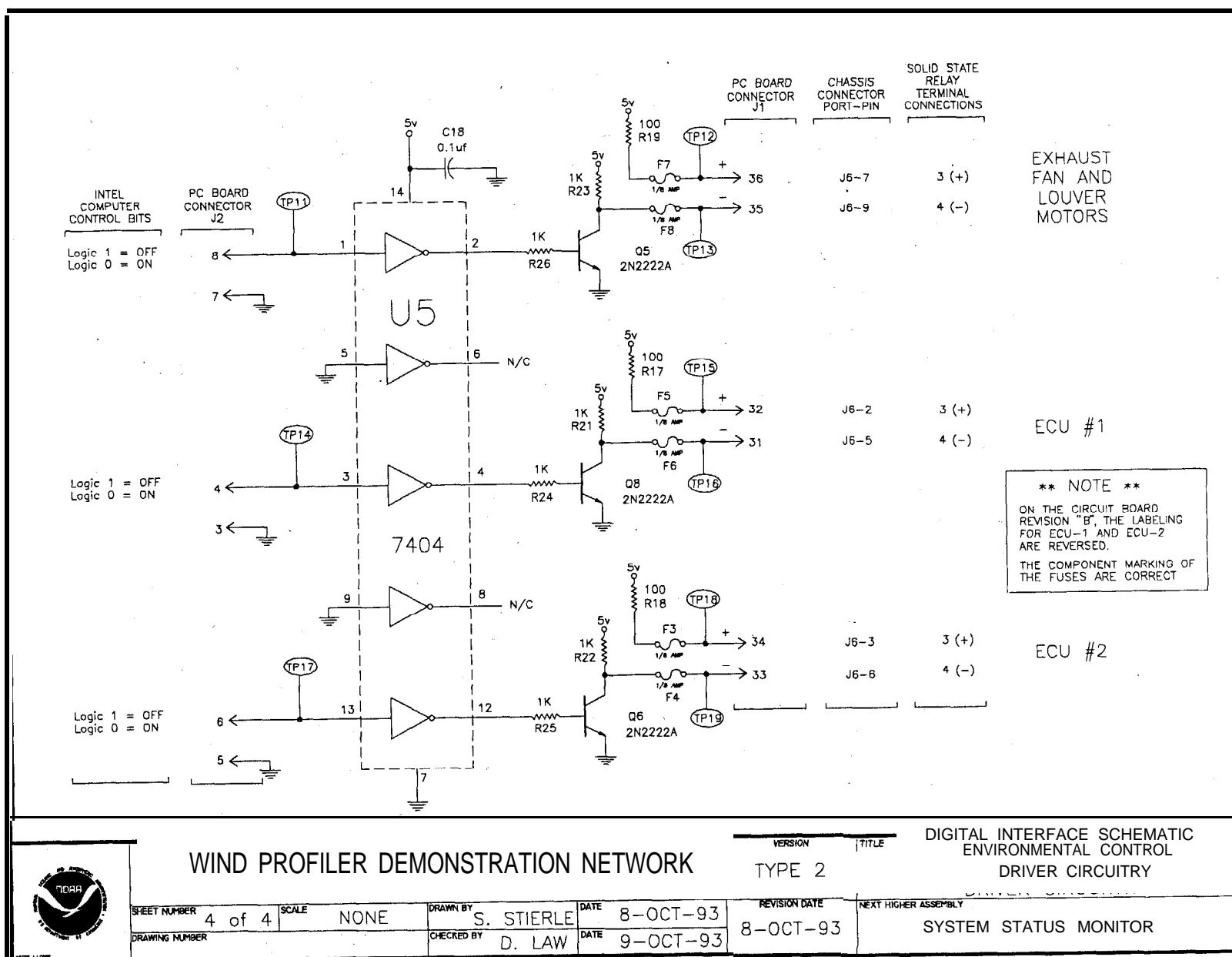
DATE 8-OCT-93
DATE 9-OCT-93

VERSION TYPE 2

REVISION DATE 8-OCT-93

TITLE DIGITAL INTERFACE SCHEMATIC
BEAM STEERING UNIT
FAULT DETECTION CIRCUITRY

NEXT HIGHER ASSEMBLY SYSTEM STATUS MONITOR



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